

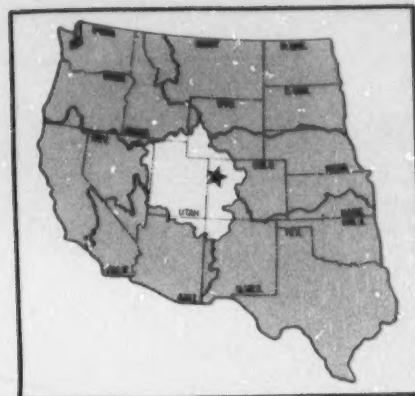
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Collbran Project

Colorado: Mesa County

Upper Colorado Region
Bureau of Reclamation

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The Collbran Project, in west-central Colorado, has developed, for multiple purposes, a major part of the unused water in Plateau Creek and its principal tributaries. Supplemental irrigation service is furnished to 22,210 acres. Electrical energy is generated for use in west-central Colorado. Major project works include Vega Dam and Reservoir, two powerplants, two major diversion dams, about 37 miles of canal, and about 18 miles of pipeline and penstock. East Fork Diversion Dam and Feeder Canal, along with the Bonham-Cottonwood Collection System, carry water to Bonham Reservoir, which supplies water to operate the Molina powerplants. The project also has rehabilitated and modified the operation of 17 small privately owned storage reservoirs on the Grand Mesa situated in the Cottonwood Creek and Big Creek watersheds. Fifteen of these reservoirs provide water for power generation through the exchange of storage water on Grand Mesa for irrigation water from Vega Reservoir. The other two reservoirs also are reserved for irrigation exchanges.

PLAN

Vega Dam was constructed across the channel of Plateau Creek, forming a reservoir with a total capacity of 33,800 acre-feet and an active capacity of 32,980 acre-feet. The reservoir stores surplus flows of Plateau, Leon, and Park Creeks. The Leon and Park Creek flows are brought to the reservoir through the 2.7-mile-long Leon-Park Feeder Canal. The Southside Canal extends west from Vega Reservoir 32.8 miles to a terminal drop structure on Mesa Creek about 3.25 miles south of the town of Mesa, Colo. The canal crosses several north-flowing tributaries of Plateau Creek to which releases are made but does not intercept their flow. Most project water from Plateau, Leon, and Park Creeks, including both storage and direct flow, is released from Vega Reservoir and delivered by the Southside Canal. Some water is released at Vega Reservoir into Plateau Creek for diversion by downstream ditches.

Water used for the generation of power is collected from the Big and Cottonwood Creek drainage areas at elevations of more than 9800 feet above sea level. These waters are stored by the 17 previously existing reservoirs on Grand Mesa or collected by the Bonham-Cottonwood pipeline and piped down the mesa slopes through two hydroelectric powerplants and released into Plateau Creek. The two powerplants have a combined capacity of 13,500 kilowatts.

Vega Dam and Reservoir

Vega Dam is near the Grand Mesa in western Colorado, about 10 miles east of the town of Collbran. The dam is a zoned, rolled earth and rockfill structure with a maximum height above foundation of 162 feet, a crest length of 2,100 feet, and a volume of 981,825 cubic yards of material. The outlet works is near the left abutment and consists of an intake structure, 5-foot-diameter concrete pressure conduit, concrete gate chamber for a 3.5-foot-square high-pressure emergency gate, 8-foot-diameter concrete horseshoe conduit containing a 51-inch-diameter steel pipe, control house containing two 2.25-foot-square high-pressure control gates, concrete stilling basin, and an outlet channel which discharges into the Southside Canal.

Vega Reservoir has a surface area of about 900 acres, with a capacity of 33,800 acre-feet, and a shoreline of approximately 7 miles.

Leon-Park Feeder Canal

The Leon-Park Feeder Canal conveys water from Leon and Park Creeks to Vega Reservoir. The 350-cubic-foot-per-second-capacity canal begins at the Leon Creek Diversion Dam on Leon Creek and extends about 2 miles to a siphon under Park Creek. Water diverted from Park Creek by the Park Creek Diversion Dam, about 1,000 feet above the siphon outlet, then combines with the Leon Creek diversions, and flows about 0.7 mile to Vega Reservoir.

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Vega Dam and Reservoir

Southside Canal

Southside Canal heads at the outlet works of Vega Reservoir and conveys irrigation water westward from the reservoir to project lands. The 32.8-mile-long canal has an initial capacity of 240 cubic feet per second and a terminal capacity of 50 cubic feet per second at Mesa Creek. Thirteen siphons carry the canal across major streams of the area, and seven concrete chutes are used to drop the canal in elevation. A 2,389-foot-long, 6.25-foot-diameter horseshoe tunnel carries the canal water through a ridge on the divide between Salt and Tea Creeks, eliminating canal construction through a badly eroded area.

Bonham Dam and Reservoir

Bonham Dam is located on Grand Mesa, 12 miles south of Collbran. The dam consists of two embankments separated by an intervening knoll. Reclamation rehabilitation in 1962 added earth and rockfill material to the crest and downstream face, raising the crest 2 feet. This allows a 4-foot freeboard above the normal reservoir water surface. The completed structure is 1,360 feet in length, has a 25-foot-wide crest, and is 38 feet high. The spillway was rehabilitated and now has a capacity of 1,830 cubic feet per second.

Bonham Reservoir, in operation for more than 70 years, has a total capacity of 1,220 acre-feet. The Bonham power water outlet works consists of a 750-foot inlet channel, intake structure to a 36-inch-inside-diameter, steel-lined conduit, and a gate structure with a 36-inch cast iron slide gate. The 36-inch steel-lined conduit is reduced to a 33-inch-inside-diameter, steel-lined pipe where it becomes the Bonham pipeline at a manhole structure about 100 feet downstream from the gate structure.

East Fork Diversion Dam and Feeder Canal

The East Fork Diversion Dam and Feeder Canal divert the natural flow of the East Fork of Big Creek and releases from Atkinson and Lambert Reservoirs to Bonham Reservoir. The East Fork Diversion Dam is a concrete ogee, gravity-type structure with overflow section and wingwalls of concrete and embankments of compacted earth at each end of the dam. The concrete headworks are controlled by one 3-foot-square slide gate, feeding the canal. The sluiceway is controlled by a 6-foot-square radial gate.

The East Fork Feeder Canal, with a capacity of 35 cubic feet per second, has a length of 1.3 miles. The first mile conveys water from East Fork to Atkinson Creek; the



Collbran Project farmlands

water is then carried by the stream channel for approximately 600 feet, where it is redirected into the feeder canal. The water is then carried by the feeder canal to its terminal drop structure, located at the east end of Bonham Dam, for storage in Bonham Reservoir.

Bonham-Cottonwood Pipeline

The Bonham-Cottonwood pipeline collects water from small streams and reservoirs in the watersheds of Big and Cottonwood Creeks and delivers it to the Upper Molina penstock. The pipeline, consisting of two main branches and several smaller feeder lines, delivers a maximum of 50 cubic feet per second to the Upper Molina penstock.

The Bonham section, 5.4 miles long, extends from Bonham Reservoir to the Upper Molina penstock. It consists of a 36-inch pretensioned concrete pipe with a maximum capacity of 50 cubic feet per second. A feeder line delivers water into this section from an unnamed stream inlet west of Bonham Reservoir.

Extending about 4 miles from Cottonwood Reservoir No. 1 to the Upper Molina penstock is the Cottonwood section of the pipeline. It receives water directly from Cottonwood No. 1, DeCamp, and Big Meadows Reservoirs, as well as from three uncontrolled stream inlets which also take releases from six other reservoirs. This section has a maximum capacity of 28.3 cubic feet per second. The pipe ranges from a minimum of 18-inch inside diameter to a 36-inch maximum.

Upper Molina Penstock and Powerplant

The Upper Molina penstock extends from the junction of the Bonham and Cottonwood pipelines, then continues approximately 2.4 miles down the north slope of Grand

Mesa, and terminates at the Upper Molina Powerplant. The penstock consists of welded steel pipe with a capacity of 50 cubic feet per second, ranging in diameter from 36 inches at the junction with the Bonham-Cottonwood collection system to 33 inches at the lower section.

Bonham Reservoir acts as a forebay for the Upper Molina Powerplant, which controls releases up to a maximum capacity of 50 cubic feet per second from the reservoir. Upper Molina Powerplant consists of a single 8,640-kilowatt generating unit constructed on the east bank of Cottonwood Creek, operating at a design head of 2,490 feet with power tailwater discharges up to 50 cubic feet per second into the Molina Equalizing Reservoir.

Lower Molina Penstock and Powerplant

The Lower Molina penstock extends 4.7 miles from the Molina Equalizing Reservoir to the Lower Molina Powerplant. The penstock consists of steel pipe ranging in diameter from 36 inches at its upper end to 30 inches at the lower section. It has a maximum capacity of 50 cubic feet per second.

The single-unit Lower Molina Powerplant is located on the south bank of Plateau Creek near Molina, Colo. It has an installed capacity of 4,860 kilowatts at a design head of 1,400 feet and a maximum water discharge of 50 cubic feet per second. Both plants are operated in conjunction with Colorado River Storage Project power operations.

Substations and Transmission Lines

Power generated at the powerplants is transformed to a transmission voltage of 115 kilovolts at two substations constructed adjacent to the plants. A 5.5-mile transmission line leads from the substation at the Upper Molina Powerplant, delivers energy produced at the plant to the substation at Lower Molina Powerplant, and then connects to the Colorado-Ute Electrical Association system for distribution.

DEVELOPMENT

Early History

Numerous small private reservoirs were constructed on Grand Mesa to regulate the runoff of Big, Cottonwood, Mesa, and Bull Creeks. These reservoirs are filled with water during the spring runoff, and the stored water is released on demand of the irrigators in Plateau Valley to supplement the low natural streamflows of late summer. Individual water users or small cooperative associations built most of the reservoirs in basins formed by glacial action.

Privately constructed canals and ditches are also operated intermittently throughout the winter months to supply the communities of Collbran and Mesa and the rural area with domestic and stock water.

Investigations

Investigations were initiated in 1937 to study the needs of the area for proper development of its abundant resources. Included in the plans for developing the necessary supplemental irrigation water for arable lands was the plan to generate additional power for industrial and domestic use.

Authorization

Authorized July 3, 1952, by act of Congress (Public Law 445, 82nd Congress, 2nd session).

Construction

The contract for construction of Vega Dam was awarded in 1957 and the dam was completed in 1960. Other con-

struction and rehabilitation contracts were awarded beginning in 1959. All work was completed in 1962.

Operating Agencies

The Bureau of Reclamation operates the 17 small Grand Mesa reservoirs, Bonham-Cottonwood pipeline, and the Molina Powerplants and penstocks. Since January 1, 1963, the Collbran Conservancy District has operated Vega Dam and Reservoir, the Leon-Park Diversion Dams and Feeder Canal, and the Southside Canal.

BENEFITS

Irrigation

Vega Dam and Southside Canal provide water for the supplemental irrigation service to 22,210 acres of project lands. Principal crops are alfalfa, hay, small grains, and pasture. These crops are used primarily to support beef cattle and sheep production.



Vega Reservoir recreation

Hydroelectric Power

Two hydroelectric powerplants are in operation, with a combined installed capacity of 13,500 kilowatts.

Recreation and Fish and Wildlife

Construction and operation of the reservoirs have improved lake fisheries and wildlife values. Some minor damage to stream fisheries and wildlife values resulted from the reduction of flows downstream from storage or diversion structures and from inundation of some stream habitat in the Vega reservoir area. However, the net effect is an increase in fish and wildlife. The Vega recreation areas are administered by the Colorado Division of Parks and Outdoor Recreation. Fishing, camping, boating, picnicking, and sightseeing are the principal activities. In 1980, visitation totaled 59,587.

PROJECT DATA

Land Areas (1980)

Irrigable area:	
Supplemental irrigation service	22,210 acres
Number of irrigated farms	184

Area Irrigated and Crop Value

Year	Area irrigated, acres	Crop value, dollars
1968	19,542	982,967
1969	19,988	1,105,788
1970	19,397	1,119,246
1971	19,878	1,356,611
1972	19,880	1,322,321
1973	20,063	1,700,052
1974	20,110	1,749,896
1975	19,769	1,884,004
1976	19,908	1,684,799
1977	19,843	1,684,877
1978	19,960	1,786,990
1979	20,110	1,954,505
1980	20,135	1,778,515

¹Colorado River runoff in 1977 was the lowest in 61 years of record. In most areas of Colorado, precipitation for the year was considerably below average resulting in lower yields because of the extreme drought.

Facilities in Operation

Storage dams (main storage and rehabilitation)	18
Diversion dams	3
Canals	37 mi
Powerplants	2
Pipelines and penstocks	18 mi

Climatic Conditions

Annual precipitation	15.5 in
Temperature:	
Maximum	100 °F
Minimum	-30 °F
Mean	46 °F
Growing season	155 days
Elevation of irrigable area	5500-7000.0 ft

ENGINEERING DATA

Water Supply

PLATEAU CREEK

Drainage area near Collbran, Colo.	88 mi ²
Annual discharge:	
Maximum (1922)	118,500 acre-ft
Minimum (1934)	21,300 acre-ft
Average	68,400 acre-ft

BIG CREEK

Drainage area at Upper Station near Collbran, Colo.	20 mi ²
Annual discharge:	
Maximum (1952)	27,000 acre-ft
Minimum (1951)	13,700 acre-ft
Average	20,200 acre-ft

COTTONWOOD CREEK

Drainage area at Upper Station near Collbran, Colo.	20 mi ²
Annual discharge:	
Maximum (1929)	20,900 acre-ft
Minimum (1934)	6,800 acre-ft
Average	13,200 acre-ft

Storage Facilities

VEGA DAM

Type: Zoned, rolled earth and rockfill
Location: On Plateau Creek, about 10 mi east of Collbran, Colo.

Construction period: 1957-59

Reservoir, Vega:

Total capacity to El. 7984	33,800 acre-ft
Active capacity	32,980 acre-ft
Surface area, El. 7984	897.5 acres
Dimensions:	
Structural height	162 ft
Top width	30 ft
Maximum base width (approx.)	880 ft
Crest length	2,100 ft
Crest elevation	7997.0 ft
Volume	981,825 yd ³

Spillway: Uncontrolled ogee crest, concrete lined chute and stilling basin on the right abutment.

Outlet works: Concrete pressure conduit from the intake structure to the gate emergency chamber, then an 8-ft horseshoe conduit, containing a 51-in steel pipe through the dam, where the discharge to Southgate Canal is controlled by two 2.25-ft-square, high-pressure gates.

BONHAM DAM

Type: Earthfill

Location: On Big Creek, about 12 mi south of Collbran, Colo.

Construction period: Rehabilitation 1962

Reservoir, Bonham:

Total capacity to El. 9796	1,220 acre-ft
Active capacity	1,000 acre-ft
Surface area, El. 9796	88 acres

Dimensions:	
Structural height	38 ft
Top width	25 ft
Maximum base width	180 ft
Crest length	1,360 ft
Crest elevation	9800.7 ft
Volume	15,000 yd ³
Spillway: Open crest with a concrete sill 250 ft wide, 1,830 ft ³ /s capacity.	
Power outlet works: 36-in welded steel conduit encased in concrete and 36-in cast-iron slide gates with a capacity of 50 ft ³ /s.	

Diversion Facilities

EAST FORK DIVERSION DAM

Type: Concrete weir, embankment wings
Location: East Fork of Big Creek.
Year completed: 1962

Dimensions:	
Height above streambed	8 ft
Weir crest length	29 ft
Total crest length	120 ft
Weir crest elevation	9863.2 ft
Volume (concrete)	144 yd ³
Volume (total)	1,000 yd ³
Sluiceway: 6-ft-square radial gate.	
Headworks: 3-ft-square slide gate.	
Diversion capacity	30 ft ³ /s

LEON CREEK DIVERSION DAM

Type: Concrete ogee
Location: Leon Creek about 8 mi east of Collbran, Colo.

Year completed: 1960

Dimensions:	
Height above streambed	10 ft
Weir crest length	51 ft
Crest length	230 ft
Crest elevation	8026.0 ft
Volume	2,000 yd ³
Overflow weir capacity	2,000 ft ³ /s
Headworks: Concrete with three 5-ft-square control gates.	
Diversion capacity	350 ft ³ /s

PARK CREEK DIVERSION DAM

Type: Concrete ogee
Location: Park Creek, about 8 mi east of Collbran, Colo.

Year completed: 1960

Dimensions:	
Height above streambed	8 ft
Weir crest length	16 ft
Crest length	140 ft
Crest elevation	8020.2 ft
Volume	1,000 yd ³
Overflow weir capacity	700 ft ³ /s
Headworks: Concrete with three 4-ft-square control gates.	
Diversion capacity	150 ft ³ /s

Carriage Facilities

LEON-PARK FEEDER CANAL

Location: From Leon Creek Diversion Dam to Park Creek and from Park Creek Diversion Dam to Vega Reservoir.
Construction period: 1960-61

Length	2.7 mi
Final capacity	350 ft ³ /s
Typical maximum section (unlined):	
Bottom width	12 ft
Side slopes	1.5:1
Water depth	5.8 ft

SOUTHSIDE CANAL

Location: From Vega Dam westerly to a point on Mesa Creek 5.25 mi south of Mesa, Colo.

Construction period: 1959-60

Length	32.8 mi
Initial capacity	240 ft ³ /s
Typical maximum section (unlined):	
Bottom width	16 ft
Side slopes	1.5:1
Water depth	4.4 ft

SOUTHSIDE TUNNEL

Location: In divide between Salt and Tea Creeks on alignment of Southside Canal.

Construction period: 1958-60

Length	2,388 ft
Capacity	240 ft ³ /s
Cross section: Horseshoe	
Height	6.25 ft
Width	6.25 ft
Lining: Concrete, thickness	3.5-7 in

EAST FORK FEEDER CANAL

Location: From East Fork westerly to Bonham Reservoir.

Construction period: 1961-62

Length	1.3 mi
Final capacity	35 ft ³ /s
Typical maximum section (unlined)	
Bottom width	4 ft
Side slopes	1.5:1
Water depth	2.4 ft

BONHAM-COTTONWOOD PIPELINE

Type: Pretensioned reinforced concrete pressure pipe

Location: From Bonham Reservoir northwest and from Cottonwood Reservoirs No. 1, 2, 4, and 5, and DeCamp, Kitson, Little Meadows, and Big Meadows Reservoirs north to a junction with Upper Molina penstock.

Construction period: 1959-62

Diversion capacity (max.)	50 ft ³ /s
Bonham section:	
Maximum capacity	50 ft ³ /s
Length	5.4 mi
Diameter:	
(Min. inside)	31 in
(Max. inside)	36 in
Cottonwood section:	
Maximum capacity	28.3 ft ³ /s
Length	4.2 mi
Diameter:	
(Min.)	18 in
(Max.)	36 in

Collbran Project**UPPER MOLINA PENSTOCK**

Location: From Bonham-Cottonwood pipeline
northwest to Upper Molina Powerplant
(southwest of Collbran, Colo.).

Type: Steel plate

Construction period: 1959-61

Diameter (outside) 36 in

Length 2.4 mi

Capacity 50 ft³/s

LOWER MOLINA PENSTOCK

Location: From Upper Molina Powerplant
to Lower Molina Powerplant (southwest of
Collbran, Colo.).

Type: Steel plate

Construction period: 1959-61

Diameter (outside) 36 in

Length 4.7 mi

Capacity 50 ft³/s

Power Facilities**UPPER MOLINA POWERPLANT**

Location: East bank of Cottonwood Creek
about 7 mi southeast of Molina, Colo., and
about 23 mi northeast of Palisade, Colo.

Year of initial operation: 1962

Nameplate capacity 8,640 kW

Number and capacity of generators (1)
8,640 kW

Maximum static head 2,688 ft

LOWER MOLINA POWERPLANT

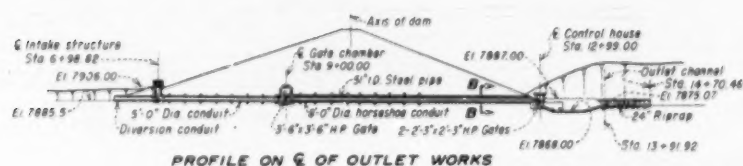
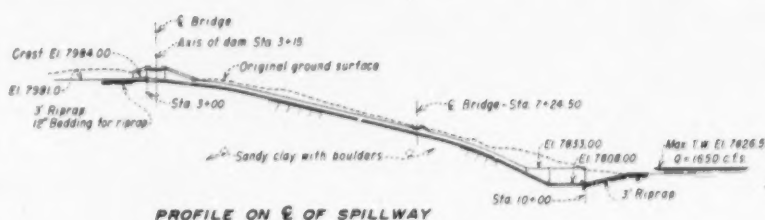
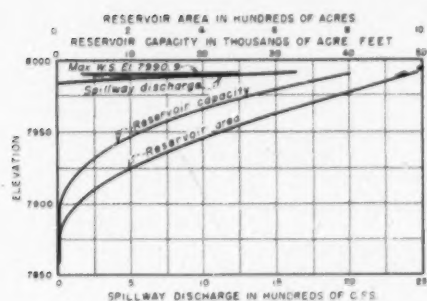
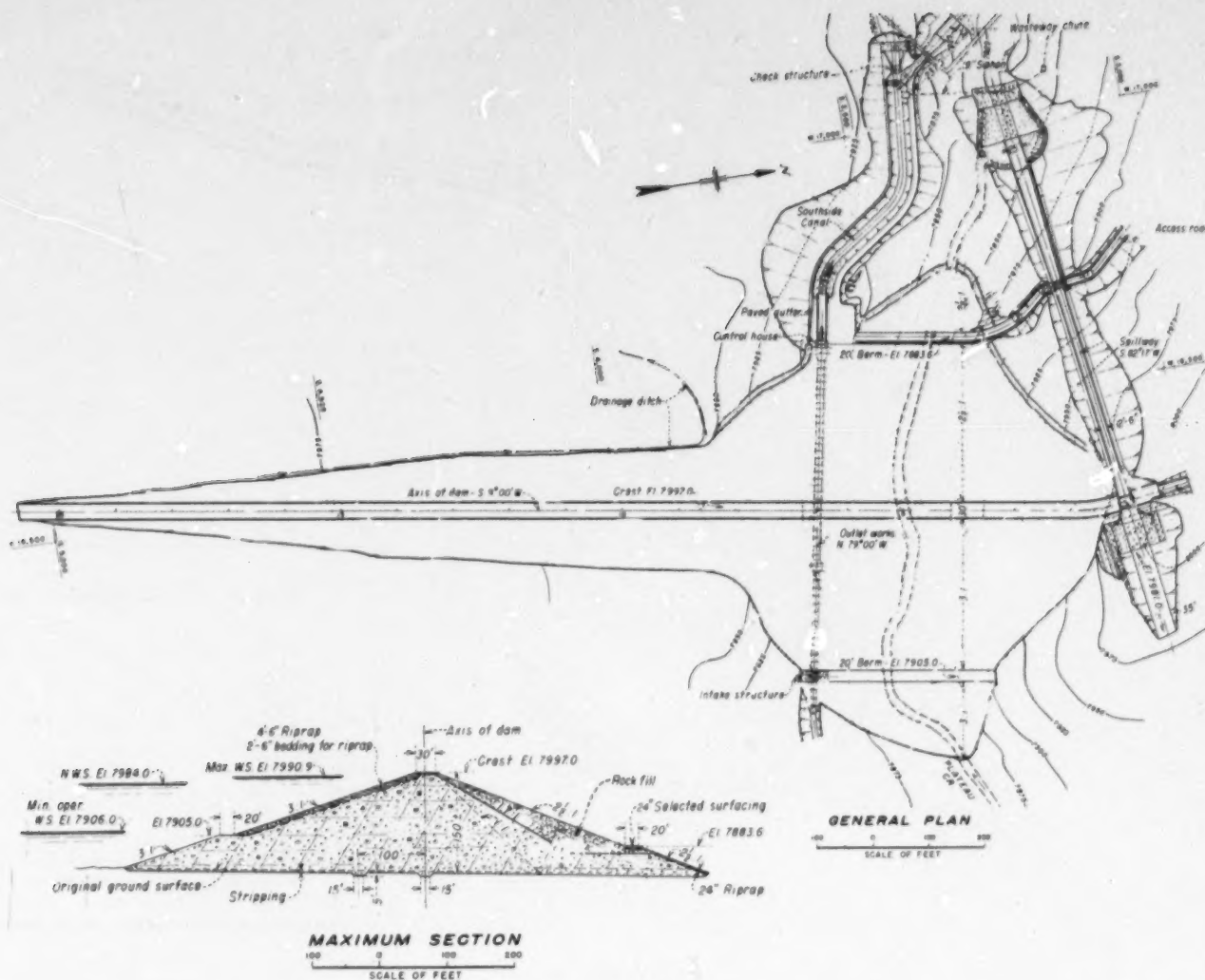
Location: On the south bank of Plateau
Creek, near Molina, Colo.

Year of initial operation: 1962

Nameplate capacity 4,860 kW

Number and capacity of generators (1)
4,860 kW

Maximum static head 1,614 ft



Vega Dam, Plan and Sections

Collbran Project

